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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/814,965	SHAMBLEN ET AL.
	Examiner	Art Unit
	Kathleen A. McNelis	1742

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2007*.
2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,5,7-25 and 27-29* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1,4,5,7-25 and 27-29* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

This is in response to the Appeal Brief filed 07/18/2007. Upon reconsideration, the finality of the 02/28/2007 Office action is withdrawn.

Claims Status

Claims 1, 4, 5, 7-25 and 27-29 remain for examination.

Status of Previous Rejections

The following objections/rejections are withdrawn in view of cancellation of claims 3 and 6, clarification that "without any addition of a metallic alloying element to the initial metallic particle" pertains only to the melting and solidifying step as previously indicated in the 03/31/2004 Advisory action:

- Claims 3 and 6 as objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.
- Claim 13 as rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention,
- Claims 3 and 6 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958),
- Claims 3 and 6 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339).

The following rejections are withdrawn in view of arguments. Grant et al. col. 3 lines 44-55 discloses that it is important to hot work the article before alloying and forming of hard phases so that the metal retains ductility followed by diffusion heat treatment below the melting temperature. Peras discloses melting to remove impurities. In view of applicant's definition of

vapor phase reduction, the rejection of claim 9 under Kuehmann et al. in view of Talmage has been withdrawn:

- Claim 25 as rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (U.S. PG Pub. No. 2002/0005089) or Kundrat (U.S. Pat. No. 5,567,224) in view of Peras (U.S. Pat. No. 3,234,608).
- Claims 1, 3, 5-7, 11, 13, 14, 15, 17-19, 24 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grant et al. (U.S. Pat. No. 3,000,734) in view of applicant's admitted prior art (paragraphs 0002-0004 of the instant specification).
- Claims 10, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958) as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608),
- Claim 9 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958), and
- Claims 10, 24 and 27 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339) as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608).

The following rejection grounds are maintained:

- Claim 24 as rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (U.S. PG Pub. No. 2002/0005089) or Kundrat (U.S. Pat. No. 5,567,224) in view of Peras (U.S. Pat. No. 3,234,608),
- Claims 1, 4, 5, 7, 11-15, 22 and 23 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958),
- Claims 1, 4, 5, 8, 10, 11, 13-15, 22 and 23 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339),

- Claim 16 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958) as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608), and
- Claim 16 as rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339) as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608).

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (U.S. PG Pub. No. 2002/0005089) or Kundrat (U.S. Pat. No. 5,567,224) in view of Peras (U.S. Pat. No. 3,234,608).

Nagata et al. discloses a method for manufacturing high purity Fe by reducing iron oxide to more than 90% Fe in a solid state, then melting (abstract, ¶ 0019 and claims 1 and 2). Although heat is used, carbon is required for reduction (¶ 0037) and therefore the mechanism is chemical reduction. Since Nagata et al. discloses reduction in a solid state, at least some reduction occurs without melting the initial metallic particle. The metallic article produced is high purity iron (abstract) or iron alloy, metallic nickel or alloys thereof (¶ 0065). Nagata et al. discloses furnishing at least two nonmetallic precursors, including iron and nickel oxides (¶ 0065), therefore the base metal and one other metallic element are added. While Nagata et al. does not recite that a nickel-base, iron-base or iron-nickel base alloy is formed; such would be the case when iron oxide is at least partially substituted with nickel (¶ 0065) in the disclosed process. While Nagata et al.

does not disclose that the melt is solidified, such would be the case since Nagata et al. discloses separation and discharge of the molten product from the furnace (¶ 0061).

Kundrat discloses a method for reducing metal oxide including chromium ore, nickel ore and stainless steel flue dust with coal or coke in a rotary hearth furnace, producing a make a feedstock for a refining vessel when manufacturing alloyed iron, steel, or stainless steel (abstract). The metal oxides are partially reduced on a rotary furnace hearth by heating in the presence of carbon to at least about 1000 °C then discharged to a melting furnace or refining vessel (col. 4 lines 10-55). In example 2, Kundrat discloses reduction of a low sulfur nickel laterite ore (contains NiO and Fe_2O_3) with coal by heating to 1200 °C, producing reduced pellets, which are discharged into an iron bath in an EAF for production of steel such as AISI 304 (col. 10 lines 21-47). Kundrat teaches that when nickel laterite is used, the mixture is transferred to an EAF for melting and deslagging (col. 9 lines 16-25). While Kundrat does not recite that the reduction is without melting the initial metallic particles, such would be expected since 1200 °C is below the melting temperatures of Ni (about 1455 °C) and Fe (about 1538 °C). Although not recited in Kundrat, the reduction is chemical since coal or coke is required. Further, in order to use the ore as intended by Kundrat to provide valuable alloying metals for producing stainless steel (col. 3 lines 8-10), one of ordinary skill in the art would expect that the reduced ore would be melted in the subsequent process step (i.e. iron bath) and subsequently solidified to produce a usable product (i.e. 304 stainless steel). Kundrat example 2 discloses non-metallic precursor compounds NiO and Fe_2O_3 (col. 10 lines 21-47).

Nagata et al. or Kundrat do not disclose that the reduced metals are produced as a cast ingot and converted into a billet.

Peras discloses a method of continuous casting direct reduced iron ores as consumable electrodes to remove contaminates including FeO resulting from incomplete reactions in the reduction processes, producing marketable forms such as billets (col. 1 line 1 – col. 2 line 17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the melting/refining method of Peras to melt the reduced iron and iron/nickel intermediate products of Nagata et al. or Kundrat to remove contaminates and producing marketable billets as taught by Peras.

Claims 1, 4, 5, 7, 11-15, 17, 18, 20-24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958).

Kuehmann et al. in view of Talmage is applied to claims 1, 4, 5, 9, 11-15, 22 and 23 as discussed in the 02/28/2007 Office action.

Further, with respect to claim 7, Talmage discloses solid-phase reduction. In examples nickel oxide (col. 8 lines 35-39) and molybdenum oxide (col. 10 lines 9-26) were reduced at temperatures of about 600 °C (col. 8 line 70 – col. 9 line 10).

With respect to claim 17, Kuehmann et al. discloses the addition of carbon, cobalt, nickel, chromium, molybdenum and vanadium (abstract) which are alloying elements.

With respect to claims 18 and 24, Kuehmann et al. in view of Talmage is applied as discussed on the 02/28/2007 Office action regarding claim 1. Further, in an example, Kuehmann et al. discloses casting an ingot then forging into a bar (col. 9 lines 40-55). The process of forming a billet is essentially the same as the example in Kuehmann et al. While the dimensions of a billet are typically larger than that of the bar disclosed in the example, the production of any particular

size bar is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, A).

With respect to claim 20 and 21, Kuehmann et al. discloses solution treatment, quenching and tempering (col. 2 lines 23-38) which is post processing and heat treatment.

Claims 1, 4, 5, 8-11, 13-15, 17, 18, 20-25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339).

Kuehmann et al. in view of Bienvenu et al. is applied to claims 1, 4, 5, 8, 10, 11, 13-15, 22 and 23 as discussed in the 02/28/2007 Office action.

Further, with respect to claim 9, Bienvenu et al. discloses an embodiment where the metal halides are reduced in gas phase (col. 2 lines 57-69).

With respect to claims 10 and 25, Bienvenu et al. discloses reduction with calcium, sodium or magnesium (col. 2 lines 6-20) in a fused salt bath (col. 2 lines 57-68 and col. 3 lines 21-34), and would therefore be present as liquid alkali (sodium) or liquid alkaline earth (Ca, Mg) metals.

With respect to claim 17, Kuehmann et al. discloses the addition of carbon, cobalt, nickel, chromium, molybdenum and vanadium (abstract), which are alloying elements.

With respect to claims 18 and 24, Kuehmann et al. in view of Bienvenu et al. is applied as discussed on the 02/28/2007 Office action regarding claim 1. Further, in an example, Kuehmann et al. discloses casting an ingot then forging into a bar (col. 9 lines 40-55). The process of forming a billet is essentially the same as the example in Kuehmann et al. While the dimensions of a billet are typically larger than that of the bar disclosed in the example, the production of any particular size bar is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, A).

With respect to claim 20 and 21, Kuehmann et al. discloses solution treatment, quenching and tempering (col. 2 lines 23-38) which is post processing and heat treatment.

With respect to claim 27, Kuehmann et al. discloses martensitic steel as discussed above regarding claim 1.

Claims 16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuehmann et al. (U.S. Pat. No. 6,695,930) in view of Talmage (U.S. Pat. No. 3,495,958) or Bienvenu et al. as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608).

Kuehmann et al. in view of Talmage is applied as set forth above regarding claim 1.

Kuehmann et al. in view of Bienvenu et al. is applied as set forth above regarding claim 1.

Kuehmann et al. in view of Talmage or Bienvenu et al. does not disclose melting and solidifying without contacting a ceramic material as in claim 16 or followed by mechanically working the metallic article as in claim 19 or post processing the metallic article as in claim 20.

Peras discloses a method for melting and casting metals in the form of bars, slabs or billets with continuous casting, which insures complete reduction of the metal and without any risk of oxidization (col. 2 lines 18-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the steel production method of Peras to melt the reduced iron and iron/nickel intermediate products of Kuehmann et al. in view of Talmage or Bienvenu et al. to ensure complete reduction of metal oxides and to prevent reoxidation as taught by Peras and desired in Kuehmann et al. in view of Talmage or Bienvenu et al. Peras discloses melting in a copper continuous casting mold 3 with a cooling device (11) (col. 8 lines 6-16), therefore melting and solidifying without contacting a ceramic material would have been obvious to one of ordinary skill in the art at the time the invention was made in view of the disclosure of Peras. Peras

discloses the use of rollers (6) to process the cast and solidified bar (5) (col. 5 line 74 – col. 6 line 8) where the rolling is both mechanical working and post processing.

With respect to claim 27, Kuehmann et al. discloses martensitic steel as discussed above regarding claim 1.

Claims 1, 4, 5, 7, 11-15, 17, 20-23 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kipphut et al. (U.S. Pat. No. 5,320,687) in view of Talmage (U.S. Pat. No. 3,495,958).

With respect to claims 1, 4, 5, 11, 17 and 28, Kipphut et al. discloses a high purity martensitic stainless steel alloy suitable for use as turbines (abstract and col. 1 lines 35-45). The properties of the steel are improved over the prior art by limiting the inclusion of impurities (col. 1 line 45 – col. 2 line 22). The steel disclosed by Kipphut et al. contains C, Cr, V, Mo, Ni, Al, Mn and Si alloying additions (col. 2 lines 5-19). Kipphut et al. discloses casting and forging gas turbine wheels (col. 3 lines 27-37).

Kipphut et al. does not disclose furnishing a mixture of at least two nonmetallic precursor compounds and chemically reducing the mixture without melting to form metallic particles.

Talmage discloses a method of producing high purity steel by powder metallurgy (col. 1 lines 10-16) and teaches that it is beneficial to use metal oxide powders as alloy additives since it is relatively easy to obtain high purity oxides (col. 5 lines 37-45). Talmage discloses the use of dry hydrogen as a reductant and oxides of Ni, Mo, W and Cu as suitable metal oxides (col. 5 lines 64-71) with substantially no melting of the metal (col. 4 lines 14-15). Talmage further discloses blending when more than one oxide or similar additive is used (col. 6 lines 34-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use and

reduce oxides of nickel and molybdenum as taught by Talmage in the steel composition of Kipphut et al. to provide high purity material as taught by Talmage and desired in Kipphut et al.

With respect to claim 7, Talmage discloses solid-phase reduction. In examples nickel oxide (col. 8 lines 35-39) and molybdenum oxide (col. 10 lines 9-26) were reduced at temperatures of about 600 °C (col. 8 line 70 – col. 9 line 10).

With respect to claim 12, Talmage teaches that the time is sufficient to achieve the desired degree of weight loss (col. 1 lines 20-30), therefore time is a result effective variable depending on the desired conversion of oxide and subject to optimization by one of ordinary skill in the art (see M.P.E.P 2144.05, II, B).

With respect to claims 13 and 14, Kipphut et al. contains C, Cr, V, Mo, Ni, Al, Mn and Si alloying additions (col. 2 lines 5-19). Kipphut et al. does not if the metallic alloying elements are added before melting (claim 14) or during melting (claim 13), however, the selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, C).

With respect to claim 15, Kipphut et al. discloses forming cast bodies (col. 3 lines 27-37).

With respect to claims 20-23, Kipphut et al. disclose aging heat treatment (col. 3 lines 7-21).

Claims 1, 4, 5, 9-11, 13-15, 17, 20-23 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kipphut et al. (U.S. Pat. No. 5,320,687) in view of Bienvenu et al. (U. S. Pat. No. 4,820,339).

With respect to claims 1, 4, 5, 9-11, 17 and 28, Kipphut et al. discloses a high purity martensitic stainless steel alloy suitable for use as turbines (abstract and col. 1 lines 35-45). The properties of the steel are improved over the prior art by limiting the inclusion of impurities (col. 1

line 45 – col. 2 line 22). The steel disclosed by Kipphut et al. contains C, Cr, V, Mo, Ni, Al, Mn and Si alloying additions (col. 2 lines 5-19).

Kipphut et al. does not disclose furnishing a mixture of at least two nonmetallic precursor compounds and chemically reducing the mixture without melting to form metallic particles.

Bienvenu et al. discloses a method for production of metal powders by reduction of metal salts in a fused bath (abstract) (i.e. fused salt electrolysis) where the metal produced can be pure metal, mixtures of metals or an alloy (col. 1 lines 62-68) where the reduced metal can be Ni, Fe, Cr and Mo (col. 3 lines 8-10). The metals are produced from metal halides (col. 3 lines 1-10) reduced by a reducing metal, preferably calcium (col. 2 lines 6-21). The resulting metal is high purity (col. 5 lines 28-41). Bienvenu et al. discloses an embodiment where the metal halides are reduced in gas phase (col. 2lines 57-69). It would have been obvious to one of ordinary skill in the art at the time the invention was made to produce metals in a fused bath as taught by Bienvenu et al. for the process of Kipphut et al. since this method produces high purity Ni, Fe and Mo which are desired in Kipphut et al.

With respect to <u>claims 13 and 14</u>, Kipphut et al. contains C, Cr, V, Mo, Ni, Al, Mn and Si alloying additions (col. 2 lines 5-19). Kipphut et al. does not if the metallic alloying elements are added before melting (claim 14) or during melting (claim 13), however, the selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (MPEP section 2144.04 IV, C).

With respect to <u>claim 15</u>, Kipphut et al. discloses forming cast bodies (col. 3 lines 27-37).

Further, with respect to <u>claim 9</u>, Bienvenu et al. discloses an embodiment where the metal halides are reduced in gas phase (col. 2lines 57-69).

With respect to claims 20-23, Kipphut et al. disclose aging heat treatment (col. 3 lines 7-21).

Claims 16, 18, 19, 20, 24, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kipphut et al. (U.S. Pat. No. 5,320,687) in view of Talmage (U.S. Pat. No. 3,495,958) or Bienvenu et al. as applied to claim 1 and further in view of Peras (U.S. Pat No. 3,234,608).

Kipphut et al. in view of Talmage is applied as set forth above regarding claim 1.

Kipphut et al. in view of Bienvenu et al. is applied as set forth above regarding claim 1.

Kipphut et al. in view of Talmage or Bienvenu et al. does not disclose melting and solidifying without contacting a ceramic material as in claim 16 or followed by mechanically working the metallic article as in claim 19 or post processing the metallic article as in claim 20, or converting the cast ingot into a billet (claims 18, 24 and 29).

Peras discloses a method for melting and casting metals in the form of bars, slabs or billets with continuous casting, which insures complete reduction of the metal and without any risk of oxidization (col. 2 lines 18-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the steel production method of Peras to melt the reduced iron and iron/nickel intermediate products of Kipphut et al. in view of Talmage or Bienvenu et al. to ensure complete reduction of metal oxides and to prevent reoxidation as taught by Peras and desired in Kipphut et al. in view of Talmage or Bienvenu et al. Peras discloses melting in a copper continuous casting mold (3) with a cooling device (11) (col. 8 lines 6-16), therefore melting and solidifying without contacting a ceramic material would have been obvious to one of ordinary skill in the art at the time the invention was made in view of the disclosure of Peras. Peras discloses the use of rollers (6) to process the cast and solidified bar (5) (col. 5 line 74 – col. 6 line 8) where the

rolling is both mechanical working and post processing. Kipphut et al. disclose aging heat treatment (col. 3 lines 7-21).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kipphut et al. (U.S. Pat. No. 5,320,687) in view of Bienvenu et al. and Peras (U.S. Pat No. 3,234,608) as applied to claim 24.

Kipphut et al. in view of Bienvenu et al. and Peras is applied as discussed above regarding claim 24.

With respect to claim 25, Bienvenu et al. discloses reduction with calcium (col. 2 lines 6-20).

Response to Arguments

Applicant's arguments filed 07/18/2007 regarding maintained rejection grounds have been fully considered but they are not persuasive.

Arguments are summarized as follows:

1. There is no objective basis for combining the teachings of Nagata or Kundrat with Peras, since Nagata or Kundrat has no teaching of contaminants. Nor does Nagata or Kundrat teach that its product cannot produce marketable billets (p. 41 line 22 – p. 42 line 17 of Appeal brief).
2. There is no expectation of success in combining Nagata or Kundrat with Peras (p. 42 lines 18-25 of Appeal brief).
3. None of Nagata or Kundrat or Peras teaches converting a cast ingot into a billet. Peras teaches casting directly into a billet (p. 42 line 26 – p. 43 line 19 of Appeal brief).
4. Kuehmann teaches producing steel by conventional melting and casting and therefore teaches away from the present approach by using conventional metals as the starting material. Talmage teaches producing a steel using metallic powders as the starting materials. Some alloying elements may be supplied as reducible compounds, but there is no melting. Talmage therefore teaches away from the present invention and there is

no objective basis for combining Kuehmann and Talmage. Further, the grounds do not address expectation of success or forming initial metallic particles (p. 20 line 13- p. 21 line 5 and p. 26 lines 3-23 of Appeal Brief).

5. Neither Kuehmann nor Talmage discloses "furnishing a mixture of at least two nonmetallic precursor compounds together comprising the constituents of the metallic article…" The major part of the constituents disclosed in Talmage is metallic powders, whereas oxides are a minor portion. The quoted language of claim 1 means that the nonmetallic compounds must furnishing the constituents of the metallic article (p. 21 lines 6-33 of Appeal Brief).
6. Neither Kuehmann nor Talmage discloses a mixture of nonmetallic precursor compounds (p. 21 line 34 –p. 22 line 5 of Appeal Brief).
7. Kuehmann, Talmage or Bienvenu does not disclose a martensitic steel composition (p. 22 line 25-p. 23 line 6, p. 33 lines 12-25, p. 35 lines 12-29 and p. 37 lines 17-28 of Appeal Brief).
8. Kuehmann, Talmage or Bienvenu does not disclose an additional step of producing a mixture of a metallic material and an other additive constituent (p. 23 lines 7-26 of Appeal Brief) or the addition of nitrogen or carbon (p. 24 lines 13-31 of Appeal Brief).
9. Neither Kuehmann nor Talmage discloses chemically reducing for a time of less than about 10 seconds. Talmage suggest that time is a result effective variable to obtain a desired degree of weight loss, not reduction (p. 25 lines 1-20 of Appeal Brief).
10. Kuehmann, Talmage or Bienvenu does not specifically recite the negative limitation of "without any addition of a metallic alloying element to the initial metallic particle" (p. 25 line 21 – p. 26 line 2 of Appeal Brief).
11. Kuehmann, Talmage or Bienvenu does not teach adding metallic alloying elements to the initial metallic particles while the initial particles are melted (p. 26 lines 4-23 and 36 lines 14-33 of Appeal Brief).
12. Neither Kuehmann nor Talmage specifically recite aging the composition (p. 26 line 24 – p. 27 line 4 and p. 37 lines 1-16 of Appeal Brief).
13. Bienvenu teaches that "the direct production of alloys in powdered form does not appear to be feasible", therefore Bienvenu teaches that it is not possible to form

metallic alloy particles without melting (p. 31 line 8-p. 33 line 11, p. 34 line 30 – p. 35 line 11 of Appeal Brief).

14. Bienvenu teaches fused salt hydrolysis which is not an electrolysis process as claimed (p. 34 lines 15-29 of Appeal Brief).
15. Peras does not mention ceramics at all and therefore does not teach melting and solidifying without contacting ceramics (p. 28 line 19 - p. 29 line 1-22 of Appeal Brief).

Examiner's responses are as follows:

1. Nagata et al. discloses iron oxide reduction to more than 90% Fe (abstract, ¶ 0019 and claims 1 and 2). This means that up to 10% is not reduced and is therefore impurity. Kundrat teaches that the oxides are partially reduced (col. 4 lines 43-55), indicating that at least part of the oxide mixture is not reduced and is therefore impurity. Peras discloses a method for utilizing such material as discussed above in the rejection grounds. The motive to combine is therefore taught in Peras.
2. Peras discloses a method for utilizing direct reduced iron ores having oxide contaminants. Nagata et al. or Kundrat teach the production of such material.
3. Peras teaches forming a billet (col. 2 lines 11-35) by continuous casting in a copper cooled ingot mold (3), forming a solidified bar (5), then hot rolling the cast material to form with a pair of rollers (6) (Fig. 2 and col. 5 line 74 – col. 6 line 8). An ingot (5) is thus formed by the continuous casting in the ingot mold (3) then converted to a billet by rolling (6). See Metals Handbook p. 8 (previously made of record) for definition of billet.
4. Kuehmann discloses forming martensitic steel comprising Ni, Co, Cr, Mo and V alloying elements by the methods recited in instant claim 1 lines 9-13. Kuehmann further discloses the use of high purity starting materials as discussed on p. 6 lines 1-4 of the 02/28/2007 Office action. Examiner has acknowledged that Kuehmann does not disclose furnishing nonmetallic precursors to produce the high purity starting materials on p. 6 lines 5-7 of the 02/28/2007 Office action. Talmage discloses that it is beneficial to chemically reduce oxides of Ni, Mo, W and Cu to produce high purity

steel powders since high purity oxides are relatively easy to obtain. The objective basis for combining the teaching of Talmage is provided by Kuehmann which desires high purity starting materials as discussed on p. 6 lines 8-17 of the 02/28/2007 Office action. Since Kuehmann desires high purity starting material including Ni and Mo for making steel and since Talmage discloses a method for making high purity starting material for making steel and recites the same elements Ni and Mo as examples, there would be reasonable expectation of success. The reduced product of Talmage is an initial metallic particle.

5. Kuehmann discloses the inclusion high purity starting materials including Ni and Mo. Talmage discloses a method for providing Ni and Mo by reducing the corresponding oxides which is beneficial for producing high purity starting materials as discussed above in the response to argument 2a and on p. 6 lines 7-17 of the 02/28/2007 Office action. Ni and Mo are constituents of the metallic article. Examiner does not agree that the quoted language limits the starting material to only nonmetallic precursor compounds. The word "comprising" is open language and does not preclude the addition of other constituents.
6. Talmage discloses reducing oxides of Ni, Mo, W and Cu (col. 5 lines 64-71) and blending when more than one oxide is used (col. 6 lines 34-45). Blending more than one oxide would result in a mixture of oxides, which are nonmetallic precursor compounds as discussed on p. 6 lines 1-17 of the 02/28/2007 Office action.
7. Kuehmann discloses a steel containing C, Co, Ni, Cr, Mo, V and Fe which is a martensitic steel composition and producing a lath martensite matrix steel (col. 2 lines 15-37), therefore Kuehmann discloses a martensitic steel composition as discussed on p. 6 lines 1-17 of 02/28/2007 Office action.
8. As discussed above, Kuehmann in view of Talmage discloses reducing a mixture of Ni and Mo. Kuehmann et al. further discloses the addition of Co, Cr and V which are an other additive constituent, as discussed on p. 6 lines 18-19 of the 02/28/2007 Office action. Further, both Kuehmann (abstract) and Talmage (col. 5 lines 64-75 and col. 6 lines 34-45) disclose the addition of carbon, which is an alloying element in steel.

9. Reduction is measured in Talmage by weight loss (removal of oxygen results in loss of weight).
10. Since Kuehmann in view of Talmage or Bienvenu does not disclose the addition of a metallic alloying element to the initial metallic particle, the method disclosed by Kuehmann in view of Talmage or Bienvenu is without such addition.
11. Kuehmann et al. discloses adding Co, Cr and V as additional additives. The addition of such additives to the melt as opposed to first mixing with the powders to be reduced in Kuehmann in view of Talmage or Bienvenu would have been obvious, since the selection of any order of performing process steps is prima facie obvious in the absence of any new or unexpected results (see MPEP section 2144.04 IV, C).
12. Ferrous metals (e.g. steel) are aged by quench aging (See Metals Handbook p. 4 for definition of "ageing (heat treatment)" and Metals Handbook p. 47 for definition of "quench aging"). Kuehmann discloses solution treatment followed by quenching (col. 2 lines 23-38), which is an aging treatment for steel.
13. Bienvenu recites that "A further advantage of the invention lies in the possibility of forming alloys in the process of production of reduced metal. To this end, it is simply necessary to inject not the metal halide MeX_n, but a mixture of several halides of different metals. By making a suitable choice of halides and more especially the chlorides of metals concerned and by introducing them in predetermined proportions, it is possible to produce alloys having a composition which will reflect the proportions of the metals introduced." (col. 3 lines 35-40). At the end of this discussion, Bienvenu recites "When <u>the direct production of alloys in powdered form does not appear to be feasible</u>, it is nevertheless possible to form the alloy subsequently by sintering from the metallic mixture...", (col. 3 lines 44-46), (the underlined portion of the quotation being that part cited by applicant). This is not the same as teaching that it is not possible to form metallic alloy particles without melting.
14. The method disclosed by Bienvenu, reduction of metal halides in a fused salt bath appears to the same as that disclosed by the instant invention, therefore the distinction is unclear. The use of different terminology to describe the process is not a patentable distinction. Applicant has not provided any discussion on how the methods differ.

15. Peras discloses melting and casting in a cooled copper mold as discussed above in the rejection grounds. Copper is not a ceramic, therefore Peras discloses melting and solidifying without contacting a ceramic material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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